Introduction to the Product Development Kit for Palm OS® 5

Palm OS 5 PDK

PalmSource Confidential

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About This Document

This document introduces the Palm OS® Product Development Kit, describing its contents, organization, new features, and use. This kit is intended for the Windows platform.

What This Document Contains

This document consists of the following chapters:

- Chapter 1, "Introduction,"provides a basic introduction to the Palm OS 5 Product Development Kit (PDK).
- Chapter 2, "Navigating the CD," details the contents of the PDK CD.
- Chapter 3, "ROM Configurations,"describes the contents of a minimum ROM, and explains how to customize the ROM for expansion, telephony, localization, and more.

Additional Resources

- Documentation

  Palm publishes its latest versions of documents for Palm OS developers at

  http://www.palmos.com/dev/support/docs/

- Training

  Palm and its partners host training classes for Palm OS developers. For topics and schedules, check

  http://www.palmos.com/dev/training

- Knowledge Base

  The Knowledge Base is a fast, web-based database of technical information. Search for frequently asked questions (FAQs), sample code, white papers, and the development documentation at

  http://www.palmos.com/dev/support/kb/

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Introduction

The Product Development Kit (PDK) for Palm OS® 5 is provided to the licensee community as a tool for porting the Palm OS platform to handheld organizers and wireless or telephony devices designed around provided guidelines. To run Palm OS 5, all such devices must be based on an ARM processor.

Components of the PDK

PDK CD

The software component of the Palm OS 5 PDK consists of a CD containing various files and pieces of information including the following:

- Palm OS 5 ROMs. ROMs created by Palm OS Ready silicon vendors or by Palm OS Licensees are not contained in this kit.
- All of the object files needed to create a functional ROM, localized for English, Japanese, and EFIGS (English, French, Italian, German, Spanish) multilingual.
- DAL (Device Abstraction Layer) source code for the Cogent 7312 reference hardware from Cirrus Logic. This code serves as the starting point for customized DALs to be created by Palm OS Ready silicon vendors or Palm OS Licensees. The DAL is composed of three layers:
  - HAL (Hardware Abstraction Layer)
  - RAL (Runtime Abstraction Layer)
  - kHAL (Kernel Hardware Abstraction Layer)
- Desktop PIM (Personal Information Manager) applications for Windows, localized for English, Japanese, and EFIGS multilingual.

- HotSync Manager and application conduits for Windows, localized for English, Japanese, and EFIGS multilingual.
- Desktop installer kit.
- Licensee localization kit.
- End user documentation kit.
- Flash utility kit.
- Software Development Kit (SDK).
- Conduit Development Kit (CDK).
- Licensee tools (ROM Builder, and others).
- PDK documentation.

Reference Hardware

While using the PDK to port the Palm OS 5 to a particular device, you will need an appropriate reference board and debugging hardware. There are two choices:

- a reference board specially designed by a Palm OS Ready silicon vendor.
- the Cogent 7312 reference board from Cirrus Logic with a JTAG Interface Unit

The most streamlined choice is to contract with a Palm OS Ready silicon vendor. The vendor will provide a reference board and a customized DAL that runs on it. You will have a head start due to the groundwork and enhancements provide by the vendor.

The Cogent board is for Licensees who wish to use Cirrus Logic chips in their devices. You get no headstart and you provide all your own enhancements. The reference DAL included on the PDK CD will run on this reference board.

Before You Begin

The PDK was developed with many audience levels in mind. The information in this kit addresses both the software side of development as well as the hardware side. Whether you are developing hardware, software, or both, you should be familiar with the technologies and tools with which you will be working.

Hardware Developers

Hardware developers should be familiar with the ARM processor. For information about ARM products, visit `http://www.arm.com`.

As a hardware developer, you will probably be contracting with a Palm OS Ready silicon vendor, who will supply a reference board, customized DAL, and, perhaps, processor chips. Starting from the Palm OS Ready customized DAL, you would use the PDK to further modify the DAL so it supports your added hardware. Consult your vendor for documentation and specifics about a particular reference board.

If you prefer to use the Cirrus Logic 7312 reference board, your starting point is the DAL as shipped on the PDK CD.

Software Developers

As a software developer, you can create two kinds of software:

- applications that have a graphical user interface (GUI) and appear like any other application to the end-user. These are similar to third-party applications.
- ARM-native libraries that do not execute independently, but exist to provide services to applications or other libraries.

Emulated 68K Environment

Software developers should be familiar with the Palm OS Platform. You can develop applications for the Palm OS 5 exactly as you did for the Palm OS 4.0. Applications under Palm OS 5 execute in a software environment that emulates the Motorola 68K processors.

For information on the Palm OS Platform, see the Palm OS web site at `http://www.palmos.com`. For the latest developer information, including a list of third-party books that discuss Palm OS application development and developer training courses available from Palm, see the developer section of the Palm OS web site at `http://www.palmos.com/dev/`.

Developers of third-party applications who are working on Windows should use CodeWarrior for Palm OS. This is an integrated development environment that is custom-tailored to

simplify the development of Palm OS applications. CodeWarrior is available from MetroWerks at `http://www.metrowerks.com/products/palm/`.

ARM-Native Libraries

As a software developer, you can also create ARM-native libraries that can be called by applications or other libraries. Libraries are the standard method for extending Palm OS 5. In fact, all components of Palm OS 5 are actually ARM-native libraries.

Use ADS (Arm Development Suite) as your development environment to create ARM-native libraries.

Development Tools in PDK

You will need different parts of the PDK depending on what you will be doing. The following table shows the different categories of development and which tools in the PDK you should use. Concentrate on the sections of the PDK that are relevant to your development tasks.

Development Area	Tools in PDK...
Application Development	SDK
Conduit Development	CDK
Licensee: Palm OS	Licensee Tools
Licensee: DAL	Licensee Tools
Hardware Development	Reference Board

Note that for some of these development tools support multiple environments and platforms. Some of them support only one platform.

SDK

The Software Development Kit (SDK), is designed to provide application developers with the essential tools, source code, and documentation necessary to build applications for the Palm OS. The

development environment for the SDK can be Windows or Unix. The IDE and development tools for each of these platforms varies widely. Refer to the Palm OS web site (www.palmos.com/dev/tech/tools) for a list of third-party tools. Palm also offers platform tools to aid in testing and debugging. The following table lists the Palm Developer Tools and the environment under which they are supported.

Tool	Windows 95 / 98 / NT / 2000
Palm OS Emulator	x
Palm Debugger	x
Palm Simulator	
Constructor for Palm OS	x
PRC to Overlay	x
Web Clipping Application Builder	x

The documentation in the `68K Application Development/SDK/Palm OS Windows/Documentation` folder provides more detail on how to use these tools. Note that the foregoing path exists only after you have installed the SDK.

CDK

The CDK supports the Windows platform and consists of three components, called suites, which provide the necessary APIs to develop conduits in the C/C++ or Java languages or for Microsoft's COM technology.

Windows Conduit Development Kit

Platform-level support for the Windows CDK is as follows:

Sync Suite	Win 95	Win 98	Win 98 SE	Win 2000	Win NT 4.0
C/C++ Sync Suite	x	x	x	x	x
COM Sync Suite	x	x	x	x	x
JSync Suite	x	x	x	x	x

The tables below show the Integrated Development Environment (IDE) support for the Windows CDK.

Sync Suite	Microsoft Visual C++ 6.0 (with Service Pack 3)	Microsoft Visual Basic 6.0	WebGain VisualCafé 4.0/4.0a
C/C++ Sync Suite	x		
COM Sync Suite	x	x	
JSync Suite			x

Sync Suite	Metrowerks CodeWarrior Professional Release 5 (w/ Patch 5.3)	Metrowerks CodeWarrior Professional 6 (IDE v4.1)
C/C++ Sync Suite	x	x
COM Sync Suite		
JSync Suite		

Refer to *Introduction to Conduit Development* in the CDK for more information on developing conduits. Note that when you install the CDK, the default location is the folder called `CDK4XX`, which in on the root directory.

Licensee Tools

Licensee tools are available on the Windows platform only. All are command-line tools, but a few have a CodeWarrior plugin version. The Licensees tools include:

- Palm Universal Debugger
- Flashable Palm Debugger
- GrabElf
- PalmRC
- PRCMerge
- MakeCard
- MakeROM
- GenerateXRD

Consult the `Documentation` folder in the PDK for details on how to use these tools for debugging, building ROMs, and building PRC interfaces (that is, graphical user interfaces).

Setting up Your Development Environment

Application Development Environment

To develop applications for Palm OS 5, developers have a variety of choices for environments. Developers working on Windows will find Metrowerk's CodeWarrior for Palm OS the most complete and convenient choice.

Before installing the PDK on your PC, make sure you have installed a recent version of CodeWarrior for Palm OS. Information on CodeWarrior can be found on Metrowerk's web site at `http://www.metrowerks.com/products/palm/`.

DAL Development Environment

You need the ARM Developer Suite (ADS) on Windows in order to modify the DAL source code and to create flashable ROM images for Palm OS devices. You also need ADX debug tools.

Development Kits

The following kits are self-installing. Click on the installer executable to install into the appropriate directories.

- CDK — Conduit Development Kit
- SDK — Software Development Kit
- EUDK — End User Documentation Kit

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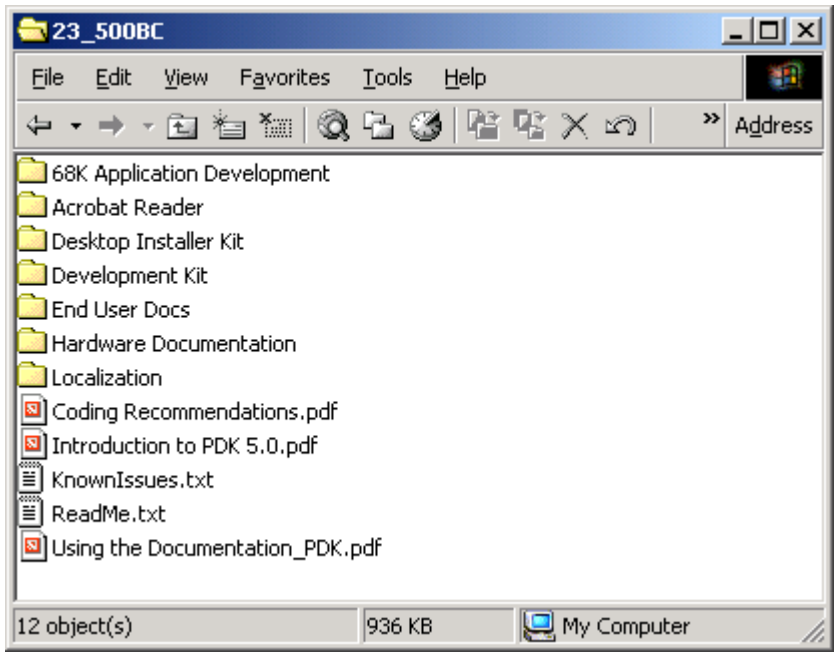
Navigating the CD

The PDK CD contains the files and information necessary to re-create the Palm OS® 5 environment on an ARM-based hardware platform. The layout of the CD is designed to provide straightforward access to the information. At the root level you will find introductory documentation and the following folders:



68K Application Development

This directory contains the Conduit Development Kit (CDK) and the Software Development Kit (SDK). Both of these kits need to be installed.

CDK	The CDK, (Conduit Development Kit), folder contains a bundled installer file of the CDK 4.02 release.
SDK	The SDK, (Software Development Kit), folder contains tools that support application development for the Palm OS.
Updated Apps	This folder contains new versions of standard PIM apps and games such as Datebook and MineHunt

CDK

This folder contains a bundled installer of the CDK 4.02 release as well as a `Readme.txt` file. The readme file contains information about the 4.02 CDK, including a list of known problems. After going through this list you may need to download the updated CDK. Please check the developer web site (http://www.palmos.com/dev/tech/tools/cdk/) for the updated CDK.

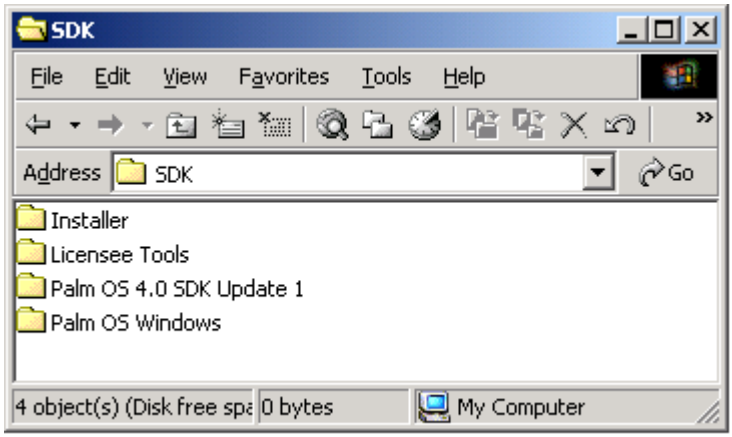
IMPORTANT: Do not install the CDK over a previous installation. You must remove any existing version of the CDK before launching the new CDK installer.

SDK

The SDK folder contains the tools, source code, and documentation necessary to build applications for the Palm OS. This folder contains the SDK for Windows only.

To install the SDK on your hard drive, click on the installer executable in the `Installer` folder or the executable in a `Palm OS 4.0 SDK Update X` folder.

The Windows installer places the files and directories shown here onto your hard disk.



Acrobat Reader

This directory contains the latest version of the Adobe Acrobat Reader. Most of the documentation contained on this CD is in PDF format. For more information on Acrobat, go to Adobe's web site at www.acrobat.com.

Desktop Installer Kit

The Palm™ Desktop Installer Kit allows you to develop and build an installer for the Windows platform and your Palm Powered handheld. The Desktop Installer Kit folder contains the files needed

to create such a desktop installer. The contents of this folder are shown here:

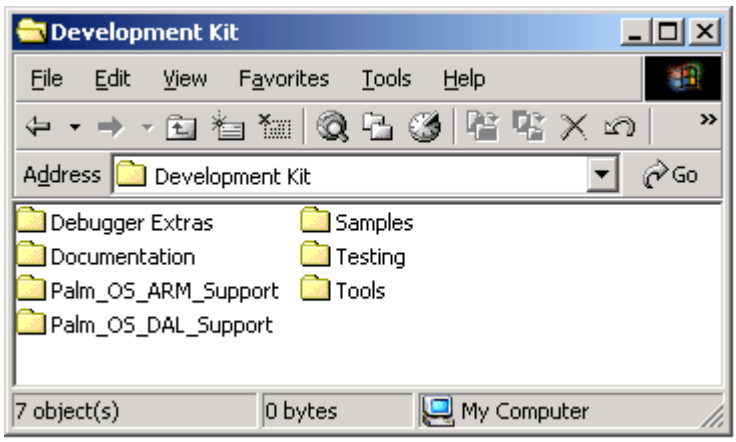
See the `Installer Guide for Windows.pdf` file for instructions on building a desktop installer.

The `readme.txt` file provides an explanation of the new features available in this release, the contents of the kit, and notes regarding installation and troubleshooting. Please read the terms and conditions of the License Agreement prior to using this kit.

Development Kit

This folder is the heart of the PDK. It contains source code for the DAL, complete samples (including source for a reference DAL for Cirrus Logic 7312), and Licensee tools.

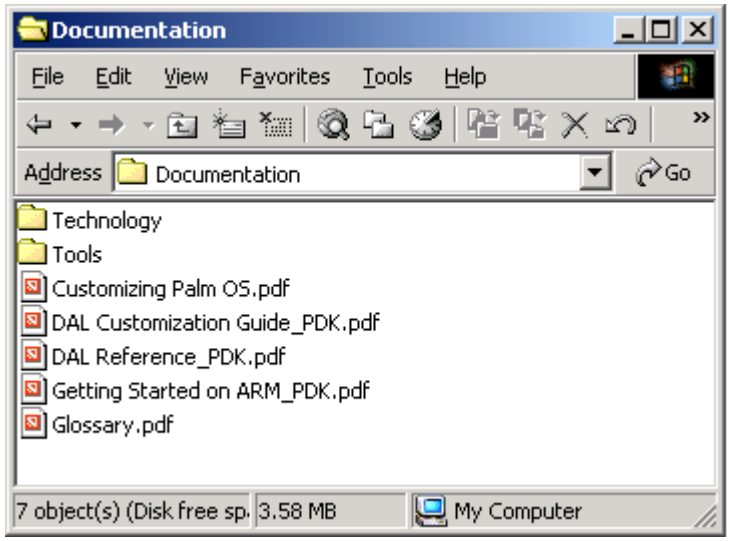
Its subfolders contain the following:



Debugger Extras	Contains the DebuggerHook folder, with files used when debugging a ROM. For more information, refer to *Debugging with Universal Debugger*.
Documentation	The Documentation folder is discussed in more detail in the next section of this chapter.
Palm_OS_ARM_Support	Header files for all components of the Palm OS. These are needed when you compile the Palm OS and the DAL.
Palm_OS_DAL_Support	Skeletal source for a DAL.
Samples	Samples of a Cirrus Logic 7312 reference DAL, a native-ARM library that calculates the value PI, and a RAM Disk implementation.
Testing	Contains the API Harness test.
Tools	Licensees Tools, particularly the whole suite of tools needed for building ROMs.

Documentation

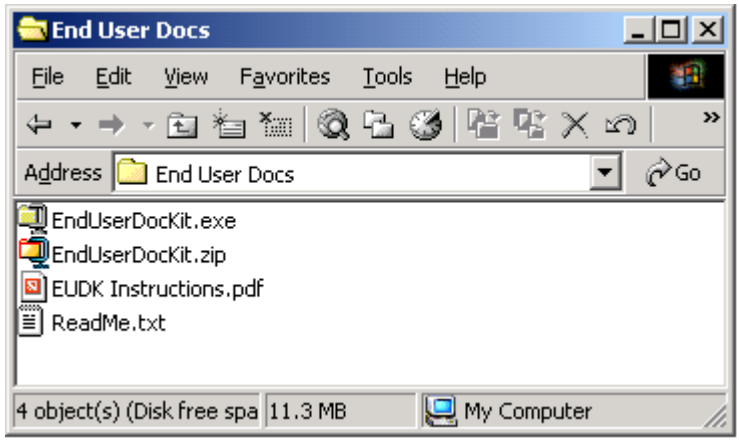
This folder is your first stop for documentation. It contains documentation that is most relevant to Licensees—guides and references about software development tasks that directly impact the DAL. These documents describe the process of modifying and debugging the DAL, building ROMs, defining user interface resources, extending the Palm OS, and using the Simulator.



Note that this folder does not contain all the documentation. Documentation describing other areas of development exists in appropriately-named folders. For instance, SDK documentation resides in the installed SDK tree.

End User Docs

This folder contains a set of FrameMaker templates that facilitate the creation of a customized handbook for your device, as shown here:



NOTE: The provided files document the Windows desktop only. As well, they are provided only in English; localized versions of the End User Documentation Kit are not included in the PDK.

The files in the `End User Docs` folder are:

EndUserDocKit.exe	This is the self-extracting file to be used under Windows. It contains the FrameMaker book and template files that reflect suggested chapters in a handbook.
EndUserDocKit.zip	This is the PKZip file to be used under Windows. It contains the FrameMaker book and template files that reflect suggested chapters in a handbook.

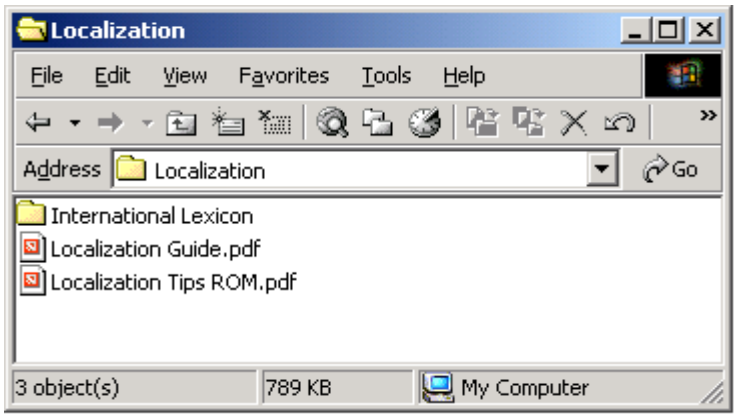
EUDK Instructions.pdf	This file describes the system requirements needed to use the kit. It also provides instructions on how to use the templates.
ReadMe.txt	This file provides instructions on how to install the templates and changes made to this release.

Hardware Documentation

This folder contains documentation that describes the minimum hardware specifications that Palm OS devices must support. It also contains an appendix describing Flash ROM capabilities.

Localization

This folder contains documentation describing the localization process plus a set of files that contain the localized equivalents of many of the terms in the Palm OS lexicon.



International Lexicon	Contains ROM and Desktop Translation Memory files, in Microsoft Excel format, for the Japanese, French, Italian, German, and Spanish languages.
Localization Guide.pdf	This guide provides instructions on how to localize the Palm OS for different locales.
Localization Tips ROM.pdf	This document provides tips and guidelines for how to localize the Palm OS ROM.

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ROM Configurations

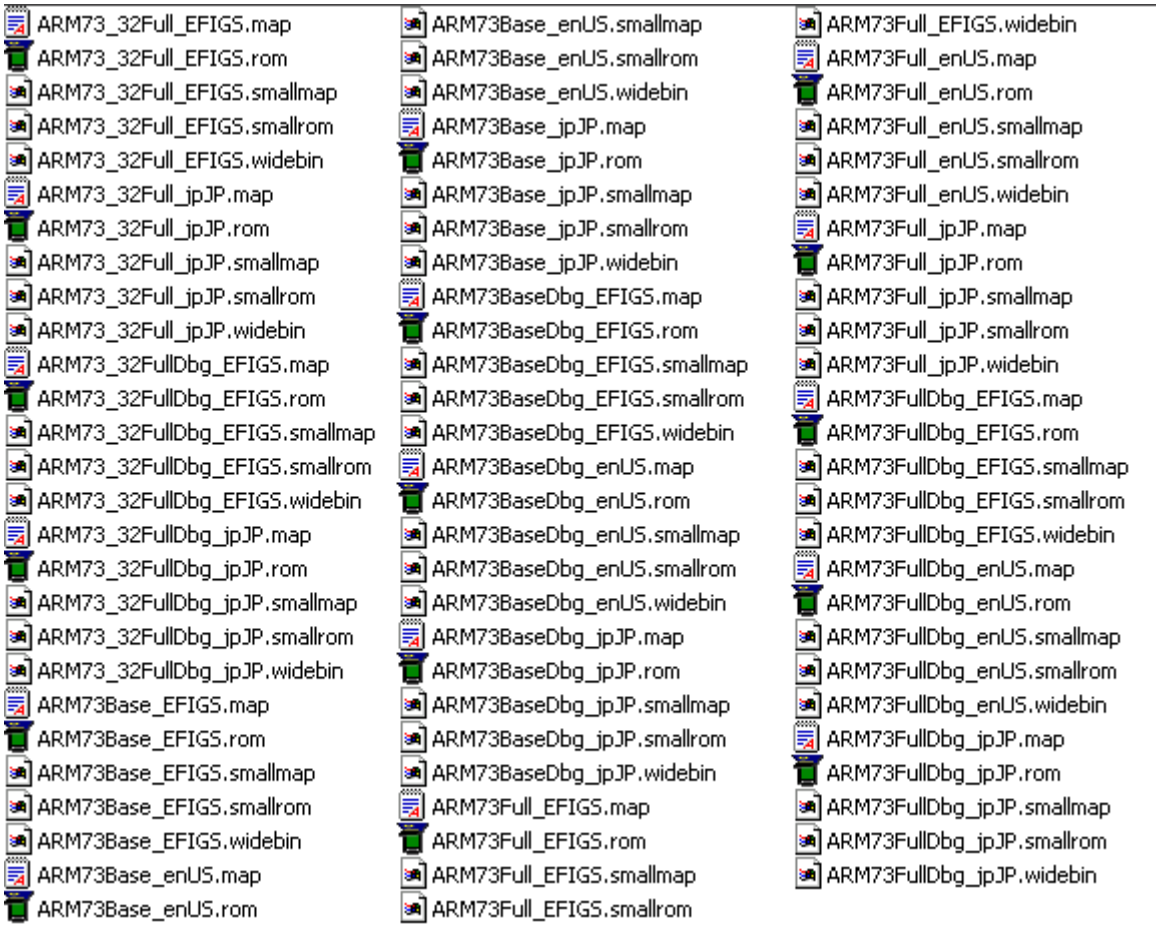
There are many ROM builds included in the PDK. As a starting point there is a common Minimal ROM configuration that all Palm OS® 5-based devices will use. To build other configurations, you simply add components to or remove components from the Minimal ROM using `ROM Builder` (on Windows).

ROMs Included in the PDK

The ARM ROMs included in the PDK are listed here:

ROM	Locale Support	Build
ARM73_32	Japanese Multi-lingual EFIGS	Full and Full Debug
ARM 73 Base	English/US Japanese Multi-lingual EFIGS	Base and Base Debug
ARM73	English/US Japanese Multi-lingual EFIGS	Full and Full Debug

The ROM files are in the `Development Kit\Tools\Components\ROMs` folder. Here is the complete list of ROM files provided in the PDK:



For each configuration there are five files, differentiated by their file extension. These five files contain different components of the build, as listed here:

Extension	File contains...
map	A debugging aid. This text file contains information on the address of every function within the ROM.
rom	The code for the entire system, including the OS, applications, and drivers. This is also known as the "big ROM."
smallmap	Map text for the small ROM.

Extension	File contains...
smallrom	A minimal ROM image consisting of a boot loader, flash driver, and a debugger stub.
widebin	The contents of the `rom` and `smallrom` images plus the memory space between them, which includes the token area. This image is used by large-scale factory ROM burners.

Minimal ROM

A minimum ROM configuration consists of a base ROM for each locale (enUS, frFR, deDE, itIT, esES). Each item below consists of either a ".prc" file, or a base prc (.bprc), along with at least one overlay (.obprc). Components described as "(with overlay)" are a base prc with an overlay.

The list of components in a Minimal ROM includes the following prc files:

- Address (with overlay)
- AddressSortLib (with overlay)
- ButtonsPnl (with overlay)
- Calculator (with overlay)
- ConnectionPnl (with overlay)
- DAL for Big ROM
- DAL for Small ROM
- Datebook (with overlay)
- DateTimePnl (with overlay)
- DefConnectionDB (pdb for each locale)
- DigitizerPnl (with overlay)
- Emul68K
- EthNetIFLib
- FormatsPnl (with overlay)

- GeneralPnl (with overlay)
- GraffitiLib (with overlay)
- HostControl
- HotSync (with overlay)
- InfraredDrvr (with overlay)
- IrCommDrvr (with overlay)
- IrLib
- LatinLocModule (with overlay)
- Launcher (with overlay)
- LocalLib
- LoopNetIFLib
- Memo (with overlay)
- NetLib or NetLib_ES
- NetTrace
- NetworkPnl (with overlay)
- OwnerPnl (with overlay)
- PadHtalLib
- PdiLib
- Ping
- PPPNetIFLib (with overlay)
- Preferences (with overlay)
- RelHtaILib
- Security (with overlay)
- SerialDrvr (with overlay)
- SerialLib
- Setup (with overlay)
- ShortcutLib (with overlay)
- ShortCutsPnl (with overlay)
- SLIPNetIFLib (with overlay)

- SplashscreenColor (with overlay) or SplashscreenMono (with overlay)
- System (with overlay)
- TcpHtalLib (with overlay)
- TCPSerialDrvr (with overlay)
- ToDo (with overlay)
- UI
- UIAppShell

Notes:

- The Serial Manager, Expansion Manager, VFSManager, and Exchange Manager are now in System.
- A serial driver for your hardware is required. Use 73xxSerialDriver or 73xxUSBDriver for the Cirrus Logic reference board.

EFIGS ROM

An EFIGS ROM contains additional components for a multi-lingual ROM that supports English, French, Italian, German, and Spanish. To create an EFIGS ROM add the following components to the Base ROM:

- LanguagePicker
- DigitizerML
- EFIGSResources

Japanese ROM

To create a Japanese language ROM, start with a Base ROM, then make the following changes:

- Replace UI with UI (jpJP variant with overlay)
- Replace LatinLocModule with ShiftJISLocModul
- Add JEDict (jpJP only with overlay)
- Replace Address with AddressJ (with overlay)

- Add UserDictPnl
- Add TextServicesLib
- Add Mix or MixT

Expansion ROM

An Expansion ROM fits into 2Mb. To change a Minimal ROM into an Expansion ROM, add the following:

- CardInfo (with overlay)
- FATFS
- a slot driver, such as 73xxSmartMedia (with overlay)

IMPORTANT: In order to use the Expansion ROM with expansion media, a slot driver must be created. It can be incorporated into the ROM by adding it to the build scripts, or installed afterwards through HotSync. Refer to the *Extending the Palm OS through Slot Technologies* for information on creating a slot driver.

Telephony ROM

A Telephony ROM fits into 2Mb. To change a Minimal ROM into a Telephony ROM, add the following:

- ATPhoneDriver (with overlay)
- Dial
- PhoneLib (with overlay)
- PhonePnl (with overlay)
- SerialPhoneTask (with overlay)
- StdGSMDriver (with overlay)
- SmsLib (with overlay)
- SmsMessenger (with overlay)

Optional Applications

The following optional components can be added to any ROM configuration, and this applies to all locales:

- Mail (with overlay)
- GraffitiDemo (with overlay)

Sample Game Components

The following game components can be added to any ROM configuration, and this applies to all locales:

- Puzzle (with overlay)
- Giraffe (with overlay)
- HardBall (with overlay)

Test Components

The following test components can be added to any ROM configuration, and this applies to all locales:

- ColorTest (with overlay)
- DriverTester (with overlay)
- SyncPickerPnl (with overlay)
- RAMDisk